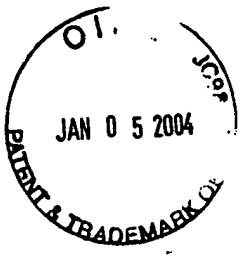

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AIR CONDITIONER CONTRROL SYSTEM USING A TELEPHONE NETWORK AND METHOOD FOR OPERATING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claiaims priority under 35 U.S.C. § 119 of Korean Application No. 2002-75976, which wavas filed on December 2, 2002, the disclosure of which is expressly incorporated by refererence herein in its entirety.

BACKGROUNIND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relatates to an air conditioner control system using a telephone network and a method for opeperating the same. More particularly, the present invention relates to an air conditioner r control system, and a method for operating the same, wherein an electronic device at a a remote location is connected to a plurality of air conditioners through the telephone nnetwork to input control commands to the air conditioners. A control program is r run in the remote electronic device to register profile information for the air conditioioners whereby control commands can be simply and conveniently input and transferred. l.

2. Description of the Relelated Art

[0003] A conventional air conditioroner control system using a telephone network will be described with reference to Fig. 1.

[0004] Air conditioners generally iv include outdoor units and indoor units. In such an air conditioner, a coolant undergoeses a thermal cycle of compression, condensation, expansion and evaporation while circulating through the outdoor and indoor units. In

this manner, a cooling or heating operatioron is performed to condition the indoor air.

[0005] Home network systems have ɛ recently been developed in which a plurality of home appliances are connected to an intɑternal network provided in a home or building. A server, in particular a home server, is ɑ connected to the internal network for controlling the home appliances in an integrated ɪ manner. The home server may be a home appliance which has a storage capabililility and sufficient data processing capacity to function as the server. Alternatively, a h home server-dedicated device may be provided to centrally control the home appliances c connected to the internal network.

[0006] Such a home network systerem may further provide a gateway function for connecting the home server to an externanal network, such as the Internet. This gateway function enables a remote user to accessss the home server in the home or building over the Internet to monitor the operating statates of the plurality of home appliances controlled by the home server and to input control ɑ commands to each of the home appliances.

[0007] For such a home network sysystem, a local area network (LAN) line must be provided in the home or building to enabable smooth transmission and reception of signals among or between the home applianceces connected to the internal network. A high speed Internet network provided on a reɾegional or country wide basis is also necessary to facilitate the remote control of the hoıome network system. However, such a home network system cannot be implemented ɪl in a region, country, or building, in which access to the Internet is limited.

[0008] To address the above problɵlem, an air conditioner control system using an existing public switched telephone netwwork (PSTN) has been developed which allows a remote user to remotely input controlol commands to a plurality of air conditioners installed in a home or building and to mmonitor the operating states of the air conditioners.

A conventional air conditioner controlol system using the public switched telephone network is shown in Fig. 1.

[0009] As shown in Fig. 1, an air coconditioner 10 is connected to a telephone terminal in a home or building so that it can b be connected with a calling party (remote user) through the public switched telephone nnetwork TN for transmitting and receiving signals to/from the calling party over the telelephone network. The remote user can call the building or home where the air conditioioner 10 is installed to establish a call connection . The remote user can then input a cocontrol command for the air conditioner 10 by manipulating buttons on a telephone 20!0. The control command is transferred to the air conditioner 10 over the public switched d telephone network TN to control it.

[0010] However, such a conventionnal air conditioner control system using the public switched telephone network TN has a d disadvantage in that only a simple operation of the air conditioner 10, such as an ON/OFFF operation, can be controlled due to a limited number of buttons provided on the telelephone 20. This limits the remotely controllable functions of the air conditioners, resultulting in inconvenience to the user and inefficient and limited utilization of remote controlol capabilities.

SUMMARY Y OF THE INVENTION

[0011] Therefore, the present invnvention has been made in view of the above problems. It is an object of the presesent invention to provide an air conditioner control system using a telephone network and d a method for operating the same. In the system and method, a remote electronic devicice, connected to the telephone network is operated to input control commands to some or r all of the air conditioners in a home or building to be controlled. A control program capapable of monitoring controlled operating states of

the air conditioners is run in the remote el electronic device to register profile information of the air conditioners. In this manner, r, at the same time that a remote user inputs a specific control command, the remote eledectronic device can automatically connect to the air conditioner corresponding to the spececific control command in order to transmit and receive signals to/from the corresponding g air conditioner.

[0012] In accordance with one aspecect of the present invention, the above and other objects can be accomplished by the provovision of an air conditioner control system that uses a telephone network to control a plulurality of air conditioners which are configured to transmit and receive signals over t the telephone network. The control system includes a remote electronic device havaving a control program configured to receive profile information for each of the plurrality of air conditioners, register the received profile information and transmit contrtrol commands to designated ones of the air conditioners over the telephone netwwork on the basis of the registered profile information.

[0013] In accordance with anotherer aspect of the present invention, a method of operating an air conditioner control sysystem that uses a telephone networks provided. The method includes running an air connditioner control program in a remote electronic device to register profile information forör a plurality of air conditioners, selecting one of the air conditioners to be controlled annd inputting a control command for the selected air conditioner into the electronic devevice. The method also includes generating a control command data packet based omn the input control command and the registered profile information for the selected air r conditioner, and automatically transmitting the generated data packet over the telephdhone network to a telephone number associated with the selected air conditioner.

[0014] According to a feature of thee present invention, profile information for an air conditioner is registered so that t a control command can be automatically transmitted to the air conditioner from a a remote location without performing a separate manual setting operation.

[0015] A graphic image-based registration window is displayed on a screen to enable a remote user to register and confirm the setting or profile information of the air conditioner. A display window is alsoso provided on the screen to display information regarding the location of the air conditioioner, a telephone number associated with the air conditioner, a unique ID of the air conditioner and other information, contained in the profile information of the air conditioner. Therefore, the remote user can input the control command for the air conditioneer with reference to the profile information of the air conditioner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The above and other objectcts, features and other advantages of the present invention will be more clearly undererstood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a view schematically showing the configuration of a conventional air conditioner control system using a telephone network;

Fig. 2 is a view schematicallyly showing the configuration of an air conditioner control system using a telephone network in accordance with an embodiment of the present invention;

Fig. 3 is a block diagram of a remote electronic device in the air conditioner control system shown in Fig. 2;

Fig. 4 is a view showing a prefeferred embodiment of a control program used in the air conditioner control system shown in Fig. 2; and

Fig. 5 is a flow chart illustratiting the operation of the air conditioner control system using the telephone network in acaccordance with the present invention.

DESCRIPTION OF THE E PREFERRED EMBODIMENTS

[0017] Fig. 2 schematically depictsts the configuration of an air conditioner control system using a telephone network in a accordance with an embodiment of the present invention. Fig. 3 is a block diagraram of a remote electronic device in the air conditioner control system. Fig. 4 c depicts a preferred embodiment of a control program used in the air conditioner c control system in accordance with the present invention.

[0018] A plurality of air conditioneners 100 are installed at various locations within a home or building to condition (i.e. heat it or cool) indoor air. Each of the air conditioners 100 is connected to a telephone terminanal at the location where it is installed, so that it is connected to an internal telephone nenetwork of the home or building. The internal telephone network is connected to a pupublic switched telephone network (PSTN) via an exchange. As a result, a remote user c can input control commands to the plurality of air conditioners 100 by making a call to o a telephone number associated with the internal telephone network.

[0019] The remote user inputs contntrol commands to the air conditioners 100 with an electronic device 200 at a remote locatition. The air conditioners 100 are each assigned a different, unique identification (ID). / Accordingly, even though the air conditioners 100 are associated with the same telephone ie number, the remote user can designate one of the

unique IDs in order to transfer a contrcrol command to one of the air conditioners 100 corresponding to the designated unique I ID.

[0020] The public switched telephcnone network PSTN is a telephone network that provides typical subscriber telephone serervices, such as voice and data switching services, to many subscribers via an exchange. l In the public switched telephone network PSTN, a local switch performs switching to a t telephone number dialed (i.e. input) by a calling party to access the dialed telephone n number. After accessing the dialed telephone number, the local switch establishes a a call connection between the calling party and a called party corresponding to the dialed tl telephone number.

[0021] The remote electronic devivice 200 preferably includes a control program driver 220 (Fig. 3) that drives a controlol program 300 through which a remote user can monitor information regarding the operarating states of the plurality of air conditioners 100 and input control commands to the air r conditioners 100. The remote electronic device also includes a data packet transmitter r 230 that transmits control command data packets created by the control program 300 to a a designated one of the air conditioners 100 over the public switched telephone networork PSTN. The remote electronic device 200 further includes a wired or wireless n modem (not shown) connected to the telephone network TN, a key input device 24(40 for entering control commands to the control program 300, and an output device 2250. The output device 250 outputs information regarding control operation results arand operating states of the air conditioners 100 resulting from the control commands ininput through the key input device 240.

[0022] Through use of the control l program 300 driven by the control program driver 220, the remote user can transfer a a control command to a specific one of the air conditioners 100 to be controlled, and d monitor information about a controlled operating

state of the specific air conditioner babased on the control command. The control program 300 may be downloaded from n the Internet through a Web browser run in the remote electronic device 200, includes a a graphic user interface (GUI), for convenient remote control of the air conditioner opererations.

[0023] The control program 300allowows a remote user to select a unique ID assigned to a specific air conditioner and input a ccontrol command for the specific air conditioner. The remote user may instead select arand control some or all of the plurality of air conditioners 100. It is also possiblele to release the control over all selected air conditioners.

[0024] In order to access the plurarality of air conditioners 100 connected to the internal telephone network, the remote u user inputs profile information for each of the air conditioners 100 into the remote electroronic device 200 to register the profile information in a database. Thereafter, when the reremote user inputs control commands for the air conditioners 100, the control program 3 300 enables the remote electronic device 200 to rapidly perform data communication wiwith the designated air conditioners on the basis of the registered profile information.

[0025] As shown in Figs. 3 and 4,4, the control program 300 includes a port setup module 310 for selecting and setting upp a communications port (for example, any one of ports COM1 to COM4) for transmissioron and reception of signals to/from the plurality of air conditioners 100 connected to the ininternal telephone network. The control program 300 also includes a registration modulele 320 for registering the profile information of the air conditioners 100. The registrationn module 320 is configured to separately register the profile information for each of the a air conditioners 100. The profile information of each of the air conditioners 100 maay include any suitable information, such as a

telephone number associated with a corrresponding air conditioner, a unique ID of the corresponding air conditioner, informatiition regarding the location of the corresponding air conditioner, and other notations. TThe control program 300 further includes a data packet creation module 330 for generatiating a control command data packet based on a control command input by the remote usaser.

[0026] When the profile informatiomn of each of the air conditioners 100 is registered, it is stored in the database of the reremote electronic device 200. When a control command is input through the control p program 300 by the remote user, it is combined with the profile information of a desisignated air conditioner, which is stored in the database, to create a control command d data packet. The remote electronic device 200 automatically transmits and receives sisignals to/from the corresponding air conditioner over a telephone line. It is also possibible to modify or delete the profile information if necessary.

[0027] The remote electronic : device 200 includes a suitable COM port (communications port), such as a serialal or RS-232 port, which can be set up on a basic input output system (BIOS). When thihis COM port corresponds to the port selected and set up by the port setup module 310, thene control command data packet can be transmitted to the telephone network through the setet-up port.

[0028] The data packet transmittetter 230 in the remote electronic device 200 is configured to receive the control commmand data packet generated by the data packet creation module 330, and to automanatically transmit the received data packet to a telephone number connected with the e corresponding air conditioner over the telephone network.

[0029] The operation of the telephhone network-based air conditioner control system

in accordance with the present invention n will now be described with reference to Fig. 5.

[0030] First, the air conditioner corontrol program running in the remote electronic device (S1) accesses the database with ti the profile information of the air conditioners to load the profile information.

[0031] After the profile informationn is loaded, a remote user selects a specific one of the air conditioners to be controlled byy designating a number or ID of the specific air conditioner from among the profile infoformation through the control program (S2). In a situation where there is no profile infoformation for the specific air conditioner in the database, or if the database is not accessssible (S3), then there is no profile information for the control program to combine with a a control command to create a control command data packet. Instead, the control progragram requests the remote user to register the profile information of the specific air conditioioner (S4) by displaying an appropriate message. However, if the profile information o of the specific air conditioner is present in the database, the remote user may proceed tl to input a control command.

[0032] If the new registration is rerequested, the remote user must input the profile information of the specific air condiditioner. As explained above, suitable profile information may include location of f the specific air conditioner, a telephone number connected with the specific air conditictioner, a unique ID of the specific air conditioner and other notations regarding setting u up a communication port for connection with the specific air conditioner (S5).

[0033] After selecting the specificic air conditioner, the remote user inputs a control command for an operation of the ainir conditioner (S6) and then clicks an execution button. Any suitable control commmand may be used, such as for controlling air direction, air volume, or air temperaturure. If the control program confirms the ID of the

specific air conditioner, the telephone e number connected therewith, and the set-up communication port, a control commanund data packet is generated which contains the control command (S7).

[0034] A determination is made as t to whether the set-up communication port is in its open condition (S8). In the situatation where the set-up communication port is determined to be in its closed conditidion, the control process is ended because it is impossible to conduct data communicacation. However, if the set-up communication port is determined to be in its open ccondition, the generated control command data packet is transmitted from the remote elelectronic device over the telephone network to the telephone number connected with the spspecific air conditioner (S9). After receiving the transmitted control command data packeket, the specific air conditioner reads the control command contained in the received c data packet and performs a control operation associated therewith (S10).

[0035] After performing the controlol operation, the specific air conditioner generates data regarding its controlled operating s; state and transmits the generated data back to the remote electronic device. The remote e user can thus monitor the controlled operating state of the specific air conditioner th through the control program run in the remote electronic device.

[0036] As is apparent from the ababove description, the present invention provides an air conditioner control system usingg a telephone network and a method for operating the same. Profile information of a plulurality of air conditioners is registered and stored in a database. Control commands foror the air conditioners are input through a control program that is downloaded through a a Web browser and implemented with a GUI. Control command data is automaticallyly transmitted to the air conditioners on the basis of

the profile information stored in the datatabase, resulting in improved convenience of remote control and automation. Further, r, a remote user can input more accurate control commands for the air conditioners becauuse the control program provides details of the operating states of the air conditioners.

[0037] It should be noted that, althouuugh the term "packet" is used herein, any form of network communication is within theıe scope and spirit of the present invention. It should also be noted that it is within thhe spirit and scope of the present invention to operate in any suitable wired or wireless n network.

[0038] While the term "air conditioioner" used herein encompasses devices which cool and dehumidify air, the term also includes heating devices, humidifiers, dehumidifiers and other devices which "c'condition" the ambient air.

[0039] Although the preferred embhbodiments of the present invention have been disclosed for illustrative purposes, thosose skilled in the art will appreciate that various modifications, additions and substitutidtions are possible, without departing from the scope and spirit of the invention as disclolosed in the accompanying claims.